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AUTHOR Ratekin, Ned
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ABSTRACT

The effectiveness of Oralographic reading instruction was investigated with a sample of 89 disabled readers in second to fifth grade from five cities; children in each city were randomly assigned to experimental or control groups. All children in the experimental group received reading instruction using the materials and procedures of the Oralographic Reading Program. The 60 lessons in this program help learning-disabled children develop systematic word-identification strategies, such as blending and manipulating spelling-pattern elements, and help provide for learning needs in the areas of attention and retention. Experimental and control groups were pretested and posttested on the Gates McKillop and Gates MacGillivie Reading Tests. On all six subtests, the Oralographic group scored significantly higher than did the control group. (Tables of findings are included.) (AA)

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THE EFFECT OF ORALOGRAPHIC INSTRUCTION ON
THE READING ACHIEVEMENT OF DISABLED LEARNERS

A FINAL REPORT
Prepared for
Prentice-Hall Developmental Learning Centers, Inc.
West Orange, N.J.

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Ned Ratekin, Ph. D.
University of Northern Iowa
July 1, 1977

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THE EFFECT OF ORALOGRAPHIC INSTRUCTION ON
THE READING ACHIEVEMENT OF DISABLED LEARNERS

A Final Report

Introduction

The success demonstrated by beginning readers in unlocking the meaning of print varies widely among children. Some children appear to progress successfully under any instructional method, quickly learning the significance of spelling patterns for word pronunciation and meaning. Others continue to have difficulty despite adequate intellectual ability and carefully planned instruction. Explanations for this difference have emphasized a possible causal relationship between the learning style of the child and the nature of the instruction. Under this view, the degree to which instructional method matches the attention, learning, and processing style of a child will determine the rate of success in the complex skill of reading.

Learning disabled children are characterized by perceptual and thinking strategies that appear to vary from those required for immediate success under many reading programs. This type of learner often displays problems in attention, in ability to integrate elements into whole complex patterns, to retain knowledge of relationships, and to flexibly manipulate known elements.

Such learners may more readily find initial success in reading through reading procedures which carefully identify the unit for attention, allow active interaction by the learner through various sensory modes, provide

for interesting repetition of experiences in order to build retention, guide the integration of elements into wholes, and also allow the child to progress at his own rate of accommodation. This study represents a search for instructional procedures which meet these needs, resulting in initial success, rather than failure, for disabled readers.

Purpose of the Investigation

The purpose of this investigation is to determine whether Oralographic Reading instruction provides a more effective method of teaching reading than is currently realized in reading programs for disabled learners.

Population

This study is based on the reading progress demonstrated by 89 disabled readers from schools in five cities: Freetown, Massachusetts; Kansas City, Missouri; Roxbury, Verona and Wharton, New Jersey. Children in a sixth school district, Millburn, New Jersey, were originally in the experiment but are not included in this report. Experimental procedures at this school were dropped when some of the control children were included in the Oralographic program before final testing.

Each of these school districts follows a formal procedure for identifying and diagnosing disabled learners. The population of this study was drawn from these disabled learners in the following manner: After identification as disabled learners, all children completed four subtests of the Gates McKillop Diagnostic Reading Tests (Oral Reading, Words Flashed, Words Untimed, Common Word Parts) and both subtests of the Gates MacGinitie Reading Test, Level A (Vocabulary, Comprehension). All children scoring

above a composite grade equivalent of 2.2 and not scoring below expectancy for their age and grade were removed from the population for this study. The remainder of the children were then randomly assigned to experimental and control groups at each location.

Of the original population of 135 disabled learners, scores of 89 remained for this final analysis. Of the 46 lost subjects, 20 were at Millburn which was dropped from this analysis; 8 students moved; 8 of the experimental subjects had not completed the program, therefore 8 control subjects also had not received post-tests; and one subject was removed from the program resulting in loss also of one control "match."

Table 1 presents the total number of children for each location for whom both pre and post-test scores were available. The grade level of these children ranged from 2 to 5 (intermediate), and ranged in age from 7 to 11.

Program Description

All children in the experimental group received reading instruction using the materials and procedures of the Oralographic Reading Program. This Program provides for systematic development in the skills of visual recognition, oral and written expression related to the sounds and written elements of the language. The Program extends over 60 lessons beginning with phonemic and graphemic elements, through blends of patterns of sounds and letters to whole words in context.

Two types of instrumentation were used by children in this study. At two locations the Oralographic content was programmed for use with a Talking Typewriter. At three sites the program was prepared for use

Table 1

NUMBER AND LOCATION OF CHILDREN IN THE STUDY

<u>School</u>	<u>Experimental</u>	<u>Control</u>
Freetown	7	5
Kansas City	9	9
Roxbury	9	9
Verona	12	11
Wharton	<u>8</u>	<u>10</u>
TOTAL	45	44

with the Talking Page and the Voice Mirror. Each daily instructional session included extended and enrichment reading without instrumentation, but based on elements of current and preceding lessons.

The instruction is individualized, with a trained monitor supervising 2 or 3 children during sessions, helping them select appropriate materials, guiding re-cycling when appropriate, and encouraging children to stay on task.

Children in the experimental group received no other direct instruction in reading.

Children in the control group received the specialized reading instruction at each location regularly provided in programs for disabled learners. These children received daily individual or small group instruction, characterized by language experience activities, re-teaching basal reader materials, auditory training, and phonics skill instruction.

Procedures and Design of the Investigation

Children in the experimental group were allowed to continue working in the Oralographic Reading Program until all 60 lessons were completed. The time span for completion of the program extended from 7 months to 16 months of schooling. The program began approximately midyear of 1975-76, and instruction for some children at one location extended into the 1976-77 school year. Upon completion of the Oralographic Program, each experimental child and a child from the control group were re-tested on the Gates McKillop and Gates MacGinitie Tests. Therefore, the instructional period for children from each of the groups is equal. Although there is a difference of 1 or 2 subjects in the total numbers of experimental and control

subjects at some locations, all children were tested to retain numbers for the total group comparison.

This project was designed to compare progress in reading skill achieved by learning disabled children receiving Oratographic Reading instruction with progress achieved by children receiving regular instruction in reading for learning disabled children. It is assumed that the progress achieved by the control group children represents the progress that would have been demonstrated by the experimental children under the regular program. For the purposes of this study, any unusual discrepancy between the progress of children in the two groups represents an effect of the instructional method. An unusual discrepancy is defined as a difference between experimental and control group scores which would occur only rarely if there was indeed no difference in their true ability. In comparing scores, a statistical probability of .05 was selected as the level at which the notion of no real difference between groups must be discarded, and the belief that a true difference between groups must be accepted.

This comparison between groups was performed on six different tests of reading ability, each measuring somewhat different aspects of the reading process. Standard scores from the Vocabulary and Comprehension subtests of the Gates MacGinitie Reading Test were used in the analysis.

Due to a wide range of ability, varying levels of the test were administered to children on the post-test. Level A was completed by 40, Level B by 42, and Level C by 6 of the children on the post-test. Also, children completed the post-test at varying times over the period of the project. The Gates MacGinitie Tests provide standard scores within grade

levels only, and the standard scores are provided for specific periods of the year, October, February and May. In addition, comparison between scores of the two groups on the pre-test indicated an inequality at some locations, requiring the analysis by covariance, using pre-test scores as a covariate in the final comparison.

For these reasons, all post-test standard scores were equated to the February norms for Level A of the Gates MacGinitie Tests. In effect, this procedure provides a measure of absolute difference between pre and post-test scores in reading ability.

The four subtests from the Gates McKillop Reading Diagnostic Tests each yield grade equivalent scores only. These scores were used in the analysis.

Outcomes of the Investigation

Despite a careful attempt to create equal groups through random assignment, pre-test scores on each of the six tests reveal a significant difference between experimental and control children in the original tests. Therefore, the final data has been processed by analysis of covariance. This analysis, in effect, provides adjustment for group differences as revealed on the pre-tests.

This analysis of covariance was carried out for each of the six reading measures to test the hypothesis that no real difference exists between reading scores of the experimental and control children on the final tests.

On each of the six reading tests the comparison revealed a statistically significant difference between experimental and control group

scores in favor of the Oralographic Program. This outcome requires that the higher scores of the experimental group be accepted as representing a higher reading performance by the experimental children than they would have gained through the regular program for disabled learners. A summary of the post-test means, F values and probability levels for between group differences from the analysis of covariance appear in Table 2. The analysis of covariance summary tables may be seen in the appendix to this report.

The actual reading level of the children in both groups at the time of post-testing may be estimated by the grade equivalent scores listed in Table 3. This table presents grade equivalents related to both pre-test and post-test means for each group on the six tests. Also, a gain in months has been computed for each group on each test. This method of comparing progress of the two groups reveals that the experimental children consistently demonstrated greater progress than control children.

The experimental children increased an average of 7 months in both Vocabulary and Comprehension, while the control children indicated progress of 2 months in Vocabulary and 1 month in Comprehension.

Both groups made greater gains on the Gates McKillop Tests. Experimental children gained an average of 10 months in the task of recognizing flashed words, 11 months in word analysis, 14 months in general oral reading ability, and 23 months in ability to recognize common word parts. Control children tended to gain 6 to 8 months on each of these four tests. The Common Word Parts test measures the ability to orally respond to nonsense words which include common English spelling patterns.

Table 2

SUMMARY OF POST-TEST
MEANS AND SIGNIFICANCE LEVELS
FROM ANALYSIS OF COVARIANCE
FOR EXPERIMENTAL AND CONTROL GROUPS
ON SIX READING TESTS

<u>Test</u>	<u>Post-Test Standard Score and Grade Equivalent Means</u>		<u>F</u>	<u>Prob.</u>
	<u>N=45 Experimental</u>	<u>N=44 Control</u>		
Vocabulary	63.35	58.63	12.69	.001
Comprehension	62.44	52.59	11.80	.001
Oral Reading	3.2	2.7	10.51	.002
Words Flashed	3.0	2.6	8.73	.004
Words Untimed	3.2	2.8	19.05	.001
Word Parts	4.3	2.9	37.19	.001

Table 3

A COMPARISON OF GRADE EQUIVALENTS
BETWEEN EXPERIMENTAL AND CONTROL CHILDREN ON
6 READING TESTS

<u>Test</u>	<u>Raw Grade Equivalent</u>				<u>Gain*</u>	
	<u>Exper.</u>		<u>Control</u>		<u>Exper.</u>	<u>Control</u>
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>		
Vocabulary	1.6	2.3	1.6	1.8	.7	.2
Comprehension	1.5	2.2	1.6	1.7	.7	.1
Oral Reading	1.8	3.2	1.9	2.7	1.4	.8
Words Flashed	2.0	3.0	2.0	2.7	1.0	.7
Words Untimed	2.2	3.3	2.2	2.8	1.1	.6
Word Parts	2.0	4.3	2.3	2.9	2.3	.7

* .1 = 1 month

This ability to independently attack unknown words appears to be a major skill outcome of the Oralographic Program.

Grade equivalents are derived scores and are not as reliable as standard scores. The grade equivalents are presented here only as an understandable basis for comparing scores of the two groups and related gains.

Authors of the Oralographic Reading Program claim that successful completion of the program should bring a child to a grade 3 reading level. A comparison of grade equivalents for the two groups reveals that the Oralographic group reached a grade equivalent of 3.0 or higher on 4 of the 6 measures. The highest performance of control group children was an average grade equivalent of 2.9 on the Common Word Parts Test.

Tables 4 - 9 present the outcomes on each of the subtests for experimental and control children at each of the 5 locations.

A direct comparison of post-test scores at particular locations should be viewed in relation to any differences in pre-test status. For example, on the Vocabulary test, control children at Verona scored higher on the post-test (64.9) than the Oralographic children (63). A comparison of pre-test scores reveals that the Oralographic children performed considerably below the control children (51.9 - 59.6) at the beginning of the study and actually realized greater gain.

Differences between scores from different schools was found to be significant only on the Words Flashed subtest. Table 7 reveals that children in the experimental group ranged from 2.5 at Kansas City to 3.5 at Verona. On all other tests the differences among schools was not

Table 4

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MACGINITIE VOCABULARY TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	55.8	68.71	54.00	56.40
	S.D.	8.11	3.19	5.19	8.38
Kansas City	N	9	9	9	9
	M	49.88	57.55	47.33	55.55
	S.D.	6.09	7.71	3.50	9.07
Roxbury	N	9	9	9	9
	M	52.44	65.	55.22	55.44
	S.D.	6.89	7.19	6.75	9.83
Verona	N	12	12	11	11
	M	51.9	63.	59.63	64.90
	S.D.	17.95	20.56	8.11	5.50
Wharton	N	8	8	10	10
	M	52.25	62.87	55.5	58.50
	S.D.	10.06	4.99	12.01	13.20
Total	N	45	45	44	44
	M	52.28	63.35	54.63	58.63
	S.D.	11.14	11.97	8.75	9.90

N = Number of Children

M = Mean Score

S.D. = Standard Deviation

Table 5

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MACGINITIE COMPREHENSION TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	57.71	67.42	50.60	57.40
	S.D.	7.38	2.76	8.56	6.34
Kansas City	N	9	9	9	9
	M	50.00	57.55	45.33	54.44
	S.D.	4.66	8.17	4.38	10.50
Roxbury	N	9	9	9	9
	M	49.11	63.55	57.22	50.44
	S.D.	6.71	7.28	9.53	12.77
Verona	N	12	12	11	11
	M	49.00	64.00	56.63	63.09
	S.D.	18.19	20.43	10.28	12.16
Wharton	N	8	8	10	10
	M	47.75	60.00	51.50	57.70
	S.D.	11.76	5.55	15.34	13.41
Total	N	45	45	44	44
	M	50.35	62.44	52.59	56.86
	S.D.	11.62	11.95	11.03	12.11

N = Number of Children

M = Mean Score

S.D. = Standard Deviation

Table 6

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MCKILLOP ORAL READING TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	1.78	2.95	1.72	2.34
	S.D.	.21	.52	.16	.69
Kansas City	N	9	9	9	9
	M	1.83	2.92	1.71	2.82
	S.D.	.32	.99	.11	1.19
Roxbury	N	9	9	9	9
	M	1.65	3.30	1.77	2.03
	S.D.	.10	.86	.18	.93
Verona	N	12	12	11	11
	M	1.93	3.62	2.19	3.22
	S.D.	.34	.62	.36	.83
Wharton	N	8	8	10	10
	M	1.78	2.78	2.08	2.84
	S.D.	.17	.33	.51	1.02
Total	N	45	45	44	44
	M	1.80	3.16	1.92	2.71
	S.D.	.26	.75	.37	1.02

N = Number of Children

M = Mean Score

S.D. = Standard Deviation

Table 7

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MCKILLOP WORDS FLASHED TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	2.18	3.18	1.86	2.86
	S.D.	.49	.30	.18	.52
Kansas City	N	9	9	9	9
	M	1.73	2.54	1.66	2.47
	S.D.	.11	.79	.18	.87
Roxbury	N	9	9	9	9
	M	1.91	3.04	1.76	2.16
	S.D.	.28	.52	.30	.54
Verona	N	12	12	11	11
	M	2.2	3.55	2.44	3.12
	S.D.	.36	.40	.60	.57
Wharton	N	8	8	10	10
	M	1.96	2.65	2.35	2.77
	S.D.	.27	.55	.91	.83
Total	N	45	45	44	44
	M	2.00	3.03	2.05	2.68
	S.D.	.35	.64	.63	.74

N = Number of Children

M = Mean Score

S.D. = Standard Deviation

Table 8

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MCKILLOP WORDS UNTIMED TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	2.48	3.55	2.20	3.16
	S.D.	.47	.19	.24	.52
Kansas City	N	9	9	9	9
	M	2.02	3.07	1.87	2.6
	S.D.	.33	.61	.44	.75
Roxbury	N	9	9	9	9
	M	1.9	3.28	1.87	2.5
	S.D.	.34	.60	.35	.62
Verona	N	12	12	11	11
	M	2.42	3.59	2.61	3.17
	S.D.	.47	.35	.55	.46
Wharton	N	8	8	10	10
	M	2.13	2.87	2.37	2.80
	S.D.	.36	.19	.80	.80
Total	N	45	45	44	44
	M	2.19	3.29	1.11	2.83
	S.D.	.44	.50	.60	.68

N = Number of Children
M = Mean Score
S.D. = Standard Deviation

Table 9

MEAN STANDARD SCORES OF EXPERIMENTAL AND CONTROL CHILDREN
ON THE GATES MCKILLOP COMMON WORD PARTS TEST

<u>School</u>		<u>Experimental</u>		<u>Control</u>	
		<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Freetown	N	7	7	5	5
	M	1.88	4.55	2.04	2.40
	S.D.	.55	.86	.63	.89
Kansas City	N	9	9	9	9
	M	1.72	4.00	1.93	2.72
	S.D.	.33	1.74	.40	1.19
Roxbury	N	9	9	9	9
	M	2.0	4.95	2.0	2.44
	S.D.	.0	.97	.0	.65
Verona	N	12	12	11	11
	M	2.40	4.30	2.58	3.75
	S.D.	.52	.98	.72	1.05
Wharton	N	8	8	10	10
	M	2.0	4.20	2.68	3.10
	S.D.	.0	1.52	.79	1.43
Total	N	45	45	44	44
	M	2.03	4.39	2.29	2.97
	S.D.	.43	1.24	.65	1.17

N = Number of Children
M = Mean Score
S.D. = Standard Deviation

adequate to indicate a "school" effect. That is, the significant difference between experimental and control groups was not dependent on especially high or low scores from one or two schools. Rather the advantage to the Oralographic children was realized as a constant across all schools.

Instrumentation Effect

At two locations, Roxbury and Wharton, 17 experimental children received instruction through the Talking Typewriter. At Freetown, Kansas City, and Verona instruction was carried out using the Talking Page. Table 10 presents the mean score on each of the subtests for these two groups. None of the differences in these six comparisons is great enough to claim a real difference. The children using the Talking Page reveal slightly higher scores on Oral Reading, Words Flashed, and Words Untimed. The talking Typewriter group performed somewhat better on the Common Word Parts test. There was very little difference between scores on the Vocabulary and Comprehension tests.

Analysis by Age

Three age groups of experimental children were identified to determine if there is any difference in the effectiveness of the Oralographic Program at different age levels. At the end of the project, 19 children were 7 or 8 years old, 14 children were 9 years old and 12 children were 10 or 11 years old. Table 11 presents mean scores of these children on the 6 subtests. Previous indications that younger children tend to progress more than older children in the Oralographic Reading Program were born out only on the Common Word Parts subtest, where the 7 - 8 year olds scored

Table 10

COMPARISON OF EXPERIMENTAL CHILDREN
UNDER TWO METHODS OF INSTRUMENTATION

<u>Tests</u>	<u>Talking Typewriter</u>	<u>Talking Page</u>
	N=17	N=28
Vocabulary	63.9	62.67
Comprehension	61.8	62.78
Oral Reading	3.05	3.22
Words Flashed	2.85	3.1
Words Untimed	3.08	3.41
Word Parts	4.59	4.26

Table 11

AVERAGE POST-TEST SCORES ON SIX SUBTESTS
BY EXPERIMENTAL CHILDREN AT THREE AGE LEVELS

<u>Age</u>	<u>N</u>	<u>Vocab- ulary</u> N=18	<u>Compre- hension</u> N=18	<u>Oral Reading</u>	<u>Words Flashed</u>	<u>Words Untimed</u>	<u>Word Parts</u>
7-8	19	65.38	65.44	3.47	3.21	3.41	4.61
9	14	62.35	61.07	2.79	2.85	3.26	4.30
10-11	12	66.75	64.75	3.10	2.95	3.14	3.65

significantly higher than the 10-11 year olds. A comparison of scores on the 5 other tests does not reveal a consistent trend to lower scores for older children. The youngest group did achieve the highest scores on all subtests except Vocabulary.

Summary and Conclusions

This study was designed to compare the effectiveness of Oralographic Reading instruction and traditional methods of reading instruction for disabled learners. Learning disabled children in five cities were randomly assigned to experimental and control conditions. Oralographic Reading instruction was provided for 45 children, and 44 children received reading instruction normally provided in special programs for disabled learners.

Pre-tests on six reading measures were applied to all children. Post-tests were administered to each experimental child after completing the 60-lesson Program, and a randomly selected control child was tested simultaneously.

An analysis of covariance, using pre-test scores as the covariate, was used to determine the significance of difference between group scores on each of the 6 measures. In each case, the Oralographic group scored significantly higher than the control group. In this study, Oralographic Reading has proved to be a more effective instructional method than procedures normally used in reading instruction for disabled learners.

A comparison between children receiving Oralographic Reading instruction on the Talking Typewriter and the Talking Page did not reveal a significant difference in effectiveness.

A comparison of children by age shows a slight but not significant trend for Oralographic instruction to be more effective with younger children.

A possible explanation for the success of Oralographic instruction is in its effectiveness in helping learning disabled children develop systematic strategies for word identification, such as blending and manipulating spelling pattern elements, as well as providing for learning needs in the areas of attention and retention.

APPENDIX

Table 12

SUMMARY TABLE

Analysis of Covariance
 Gates MacGinitie Vocabulary Test
 Comparison of Post-test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	4327.813	1	4327.813	63.720	.000
Main Effects	1019.398	5	203.880	3.002	.016
School	107.706	4	26.926	.396	.811
Group	861.859	1	861.859	12.690	.001
2-Way Inter-Actions	380.977	4	95.244	1.402	.241
Residual	5297.680	78	67.919		
Total	11025.867	88	125.294		

Table 13

SUMMARY TABLE

Analysis of Covariance
 Gates MacGinitie Comprehension Test
 Comparison of Post-Test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	4054.830	1	4054.830	46.345	.001
Main Effects	1578.935	5	315.787	3.609	.005
School	502.792	4	125.698	1.437	.230
Group	1033.048	1	1033.048	11.807	.001
Interaction	832.898	4	208.224	2.38	.059
Residual	6824.438	78	87.493		
Total	13291.102	88	151.035		

Table 14

SUMMARY TABLE

Analysis of Covariance
 Gates McKillop Oral Reading Test
 Comparison of Post-Test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	8.873	1	8.873	13.786	.001
Main Effects	10.573	5	2.115	3.286	.010
School	3.046	4	.761	1.183	.325
Group	6.764	1	6.764	10.510	.002
Interaction	5.110	4	1.277	1.985	.105
Residual	50.200	78	.644		
Total	74.756	88	.849		

Table 15

SUMMARY TABLE

Analysis of Covariance
 Gates McKillop Words: Flashed Test
 Comparison of Post-Test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	11.617	1	11.617	36.644	.001
Main Effects	6.893	5	1.379	4.349	.002
School	3.610	4	.903	2.847	.029
Group	2.769	1	2.769	8.735	.004
Interaction	2.014	4	.504	1.588	.186
Residual	24.728	78	.317		
Total	45.252	88	.514		

Table 16

SUMMARY TABLE

Analysis of Covariance
 Gates McKillop Words: Untimed Test
 Comparison of Post-Test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	10.359	1	10.359	45.119	.001
Main Effect	6.783	5	1.357	5.909	.001
School	1.909	4	.477	2.079	.091
Group	4.374	1	4.374	19.051	.001
Interaction	.902	4	.225	.982	.422
Residual	17.908	78	.230		
Total	35.952	88	.409		

Table 17

SUMMARY TABLE

Analysis of Covariance
 Gates McKillop Common Word Parts Test
 Comparison of Post-Test Scores

<u>Source of Variation</u>	<u>Sum of Squares</u>	<u>DF</u>	<u>Mean Square</u>	<u>F</u>	<u>Signif. of F</u>
Covariates	2.449	1	2.449	1.807	.183
Main Effects	53.651	5	10.730	7.918	.001
School	1.223	4	.306	.226	.923
Group	50.403	1	50.403	37.193	.001
Interaction	10.450	4	2.612	1.928	.114
Residual	105.703	78	1.355		
Total	172.252	88	1.957		